

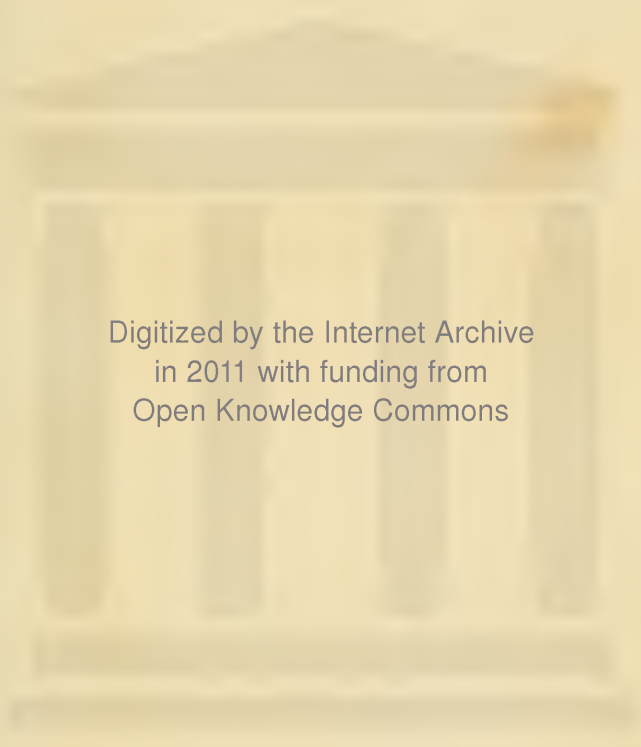
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With A.B. South's respects -

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John D. Dwyer

1875

John D. Dwyer

A

THESIS ON THE CATARACT,

WITH SOME REMARKS ON

THE EYE.

BY

ARTHUR B. STOUT.

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PRESENTED TO THE FACULTY OF THE COLLEGE OF PHYSICIANS AND SURGEONS,
OF NEW-YORK, FOR THE DEGREE OF DOCTOR OF MEDICINE.

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TO THE

FACULTY

OF THE

COLLEGE OF PHYSICIANS AND SURGEONS OF
NEW-YORK,

THIS

THESIS ON CATARACT

IS RESPECTFULLY ADDRESSED

BY

THEIR MUCH OBLIGED PUPIL,

ARTHUR B. STOUT.

This opportunity of expressing his gratitude, esteem, and affection, to

DR. EDWARD DELAFIELD,

DR. JOHN KEARNY RODGERS, and

DR. JAMES EDWARD CORNELL,

for their constant kindness, while under their observation at the College and Hospital, and the many facilities for improvement afforded him from their private practice, is embraced with much pleasure, by their

Attached friend,

ARTHUR B. STOUT.

ON THE EYE,

AND

OPHTHALMIC SURGERY.

THE eye is the most perfect object in Nature ; and, as perfection and order constitute beauty, it is also the most beautiful. Within the narrow limits of its orbit, may be found illustrated nearly all the grand physiological phenomena of the animal system. With the exception of the functions of respiration, digestion, and ideality, there are none, I believe, of the great processes of animal nature, which are not discoverable in the eye ; and manifested there in the utmost perfection.

The delicacy, and minuteness of its anatomy, are no where surpassed in the body ; and, with regard to the globe of the eye, its normal structure is less frequently departed from than in any other organ. The distribution of its blood vessels, which elsewhere admits of variation, is always precise ; neither are adventitious muscles ; an unusual formation of bone ; or irregular position of parts, ever found in this admirable and wonderful organization. The result of such accuracy of arrangement, is the great perfection and harmony of its functions. Where is the process of secretion more completely elaborated ? the crystal dew is not so transparent as the humors of the eye. As rapid as thought is its muscular motion ; and intense as is this action, the utmost skill, and care of the artist cannot direct an instrument so precisely to the point required, as the

muscles of the eye adjust its position. The iris, which is now admitted to be muscular, displays the most astonishing celerity, and precision of motion ; in constant readiness to protect the nerve of vision from the effect of too much light, it yet never prevents its receiving enough. Viewed as an instance of involuntary muscularity, it is assuredly the most perfect specimen in the body. The combination of power in the external voluntary muscles of the eye, is a peculiar endowment found in no other part of the muscular system. Though they are usually considered, and are in the main, voluntary muscles, they are, also, to a certain extent, involuntary. If the eye be directed to one object, to the exclusion of every other, for a very short space of time, the object becomes obscure, and presently cannot be seen. When, however, the slightest variation of the eye admits the rays of light from another object, the former is instantly seen with clearness. The sensibility of the eye seems to require this constant relief. But the will cannot be supposed to take cognizance at all times, of the time and necessity for this slight alteration in the direction of the eye ; nor can the motion be made without the assistance of the external muscles. In this respect, therefore, their action is involuntary—though they are still constantly subject to the influence of the will. The endowments of the eye, attributable directly, and solely, to the nervous system, are its sensibility and the sense of vision ; and no where in the body is sensibility more exquisite, than in this organ. From the facility with which so delicate a structure may be deranged, it has been rendered by an all-provident Creator intensely alive to the least approach of danger. In regard to the sense of sight, what would be man exiled from intercourse with the natural objects which surround him ! Herein comparison with the other senses is impossible, for all are exquisite and perfect. But as it contributes essentially to the happiness of man, it is certainly among the most important of the animal functions ; and it is far beyond comparison with any of the known attributes of inanimate nature.

It is curious, that nearly all the elementary tissues enumerated by Bichat may be found in the orbital space; affording a study, on a small, but perfect scale, of most of the structures in the animal economy. Thus, the dermoid tissue covers the palpebræ; the adipose, constitutes the soft cushion in the orbit, whereon the eye rests, and which supports the ophthalmic vessels and nerves; the cellular is every where, but is probably finer in its texture between the coats of the eye than in any other situation. The muscular is illustrated in the external muscles of the eye, and still more beautifully in the iris. The sanguineous, is found in the ophthalmic vessels: and three at least of its six terminations, viz. into veins, by exhalents, and by inosulation are here apparent. The lymphatic system exists in the eye, as elsewhere; and the glandular is found in the lachrymal and Meibomian glands. The nervous system is developed in all its varieties, except that devoted to ideality; the optic, is the nerve of sense; the sympathetic, or nerve of organic life, pervades every part of the system, and hence must also be here; and the lenticular ganglion, where a nerve of sensation and one of motion unite, to proceed in conjunction to the interior of the eye, constitutes another beautiful example of the wisdom and design manifested in the human frame. The orbit itself, displays the osseous system; the conjunctiva, the mucous; and the serous, is developed in the hyaloid membrane, and in that of the anterior chamber of the eye. These are sufficient examples.

Another striking evidence that the eye is the most delicately formed, and highly perfected of the Creator's works, is the care with which He has guarded it from injury. Observe the situation of the elaborate mechanism of the ear; deeply lodged in the centre of the hardest of the bones, and remote from the surface of the body, it cannot be assailed by any but the most destructive and fatal violence. Nor can the anatomist approach it without the greatest difficulty. Like it, the eye is nearly surrounded by bone; and, in front, where it appears more exposed, it is equally well protected. The palpebræ de-

fend it from trifling injuries ; while every muscle in the body may be thrown into instantaneous action to guard it from ruder assaults.

Such are a few of the points of beauty in the physical functions and structure of the eye. Did none such exist, its endowments alone are sufficient to elevate the mind to the highest degree of wonder and admiration. If the great universe be created on a scale too comprehensive for the mind to embrace, and thus ascend from nature to nature's God, in this small organ it may range at large ; and those unacquainted with the construction of the instrument, have yet a more ample scope for their imagination in its two-fold endowments. Its first, the power of vision, scarcely surpasses its second, the *power of expression* ; and if it be incomprehensible how the image of an object on the retina produces an idea of that object in the mind, we are equally lost when we inquire into the mysterious faculty of the eye, to embody and express to another our inmost thoughts and feelings.

In the eye, the surgeon possesses the most interesting field for practice, and also for pathological research. Anatomy and observation make known to him the precise normal condition of the organ. He is, thereby, enabled to discover the least, and earliest departure from it ; and thence, the origin, progress, and decline of disease are delineated, as by a picture, to his view. The remark is true of nearly all the structures of the eye. As, however, disease in each assumes a different form according to its organization, the surgeon has the enviable opportunity of forming a perfect diagnosis between them. In the varieties of the same disease, alike facilities are afforded ; for, as it is viewed where it exists, and not by remote symptoms, the slightest changes in form may be noted. Witness the simple and metastatic iritis. The acute form of all diseases are comparatively easy of management ; but the atonic, and chronic forms, often baffle the most skilful and experienced. It is here, the ophthalmic surgeon enjoys his greatest advantage. He has seldom to discriminate between the primary and secondary

affection ; and as its pathological condition is not concealed, he may observe the precise effect of remedial agents ; the time they prove of service ; and when they cease to be of benefit.

The preservation of sight, is secondary only to the preservation of life. Though the ophthalmic surgeon is not denied the fame derived from the second, his reputation is chiefly due to the first. And yet, so immediate and palpable is the change he may often effect for his patient, translating him as it were from darkness to light, that more *éclat* may accompany his career, than often the physician enjoys, who preserves life, but whose strength has been expended in a hidden course, where neither the intensity of disease, nor his skill could be adequately appreciated.

Notwithstanding its advantages, this beautiful, and now, highly perfected branch of surgery is in this country neglected. In America, general surgery and medicine may be deemed to have attained as high a rank as in Europe ; but in ophthalmic surgery, Germany and England are yet far in the advance. With the exception of a few distinguished persons, scarcely any are sufficiently acquainted with the diseases of the eye to have confidence in their own knowledge. In our colleges the subject is cursorily glanced at in the courses on general surgery, and the student becomes too much engrossed in them during his short term of study, to resort privately to the imported books on the subject. From this indifference at the fountain head of learning, a general ignorance is allowed to exist throughout the profession. The surgeon, who while a student received no impulse, and was too deeply engrossed in general pathology to commence alone, having retired to his office, or the country, finds in his *vis inertiae* a sufficient argument to prevent a prosecution of the study. In Germany and England, the universities are endowed with a distinct professorship for ophthalmic surgery, while at Vienna the subject is divided into two branches, viz : a practical and general course of ophthalmology. Of these, the practical course consisted of five lectures weekly, and was of ten months duration. In all these places

numerous treatises on the eye have been published. Journals devoted to ophthalmic surgery, are also supported in the great cities of Europe. The consequence of such attention must be a general diffusion of knowledge: and the student, if only partially instructed, has at least, been far enough introduced to estimate the beauty, and the value, of the study. He is competent to continue his researches alone; and soon enabled to contribute to the advancement of the science. Were such efforts made in our own country, the same proficiency might be effected in this branch, that has been obtained in the general sciences. Perhaps no fact will better illustrate the general deficiency of knowledge in ophthalmic surgery than the records of the New York Eye, and Ear Infirmary. This institution was founded in 1820, by Drs. Delafield and Rodgers, and until the last year has been the only institution of the kind in the city. None previously existed. It has possessed no means of obtaining notoriety beyond the gradual diffusion of its name through those who had enjoyed its benefits. Without a public building to command attention; or a corporation to give it eclat, and attract the confidence of the public, it has received between one and two thousand patients during the year. And since its foundation has afforded relief to seventeen thousand persons. Another ophthalmic institution, recently commenced in the city, is already in a flourishing condition:—and the few surgeons who have devoted particular attention to the eye, in their practice constantly receive patients, not only from physicians in the country, but from those in the city, who are compelled to decline the cases.

In making these remarks, I presume not to speak as one acquainted with the subject; but the neglected condition of ophthalmic surgery must be apparent to any who will give it a moment's attention. I speak, but as one willing to commence its study with ardor and perseverance.

C A T A R A C T .

THE one of the many diseases of the eye, I shall attempt to describe, is CATARACT.

This affection occurs in the crystalline humor of the eye, and its investing membrane. These parts it is necessary to understand in their normal state, and relations, before their diseased condition can be properly described.

Anatomy.—The eye consists of three transparent substances, called humors; a nervous expansion, termed the retina; and certain membranes, which surround them, retain them in their situation, and contribute to their nourishment.

These humors are named the aqueous, the crystalline, and the vitreous. They fill the eye; the aqueous being situated anteriorly; the crystalline, in the middle; the vitreous, posteriorly; and they are held distinct by membranous septa.

The vitreous humor occupies two-thirds of the cavity of the globe; the remainder is devoted to the aqueous, and crystalline humors, with the exception of the space occupied by the iris, and ciliary processes.

The crystalline humor is concerned in cataract; to it therefore, I confine my attention. This humor, or the lens, as it is as frequently termed, is situated in a concavity in the centre of the anterior surface of the vitreous humor, immediately behind the iris and pupil. The canal of Petit surrounds its circumference. Though so near the surface its transparency renders it invisible.

The lens is the most firm and dense of the humors. It is perfectly transparent, and possesses a high refractive power. It measures about two and a half lines in thickness, and twelve or fourteen in circumference. The convexity of the anterior

and posterior surfaces differs very considerably ; the former being the segment of a sphere about five lines in diameter, while the posterior is one from six to nine in diameter. The size of the lens, however, is not constant. It varies much in different persons, and frequently also, in the two eyes of the same person. Neither is its form always so perfect as it is usually represented. The lens consists of two portions ; an external softer part, called the cortical substance, and the central portion, or nucleus. This soft, gelatinous, substance is arranged, in regular concentric layers, increasing in density as they approximate the centre of the lens. These may be easily separated when the lens is hardened by alcohol, or by boiling. The layers are slightly connected by cellular substance, and have between them a trace of fluid. The exterior of the lens is bathed by a fluid, which separates it from its investing membrane, and is called, from the name of its discoverer, the fluid of Morgagni.

A distinct investing membrane, called the capsule of the lens, surrounds this body in every part. This is thicker than the hyaloid membrane which invests the vitreous humor, and is more vascular. It possesses a fibrous texture. Owing to different portions of it becoming opaque in different cases, it is divided for the sake of convenience into an *anterior capsule* or that portion which covers the anterior convexity of the lens ; and a *posterior capsule*, or the investment of the posterior convexity. There is, however, no natural division. This capsule is plentifully supplied with blood ; but nerves have never been detected in its substance. The *arteria centralis retinae* supplies the posterior portion ; and branches are given off from the short ciliary arteries which ramify upon its anterior surface. The veins of the choroid coat, receive the blood from the posterior capsule ; but in the anterior no veins have been discovered. It is the capsule of the lens which probably secretes the fluid of Morgagni, for its outer surface is connected by cellular substance to the hyaloid membrane ; and the canal of Petit, with which it communicates, is always empty ; while its inner surface is smooth and soft, like that of a secreting membrane.

Its possessing also a free distribution of blood vessels, only a very few of whose branches enter the lens, would appear to indicate it as a secreting membrane.

The lens and its capsule, are retained in their proper situation by the hyaloid membrane. This membrane, after covering the posterior portion of the vitreous humor, arrives at the circumference of its anterior surface. It here turns upon the anterior part of the vitreous humor, and lies beneath the ciliary processes, where from some peculiarities it possesses, it is called the zonula of Zinn. At the apices of these processes, the hyaloid divides into two layers, each of which is, however, as firm as the single membrane. One layer now passes behind the lens and capsule, closely attached to the vitreous humor, and also adherent to the capsule of the lens. The other passes over the anterior surface of the capsule, forming a close connexion with it. It is bathed in front by the aqueous humor. By this division, a small space is left between it and the circumference of the capsule of the lens. This was first detected by M. Petit, and after him, is called the canal of Petit. It does not contain a fluid. These membranes, like the humors they inclose, possess the most perfect transparency.

Definition.—CATARACT is an opacity, either partial or complete, of the crystalline humor of the eye; of its capsule; or of both conjointly.

It is usual to include in the definition of cataract, an opacity of the fluid of Morgagni; but as this fluid exists in an extremely small quantity; and is so situated that its discoloration alone cannot be recognised, I prefer to omit it. Indeed any opacity of this fluid, per se, is doubted; or if it could exist, the disease would probably have extended to the lens or capsule before any derangement of the eye was suspected. Again, the fluid of Morgagni must be a secretion, either from the lens, or capsule, probably from the latter, and consequently could not become altered in character, without previous disorder of its secreting surface. It would not be more refined to indicate as

a division of the disease, opacity of the hyaloid membrane which covers the capsule, than to designate as a separate affection, that of the fluid it contains.

Mr. Lawrence, in his recent work on the eye, adds to the definition of cataract, "opacity" &c., "with corresponding diminution of sight." The loss of sight, however, is but an *effect* of the disease. It is a consequence of the exclusion of light, and is not a part of the disordered action which constitutes the affection. If it be proper, to add one of its effects or symptoms to the definition of the disease, it must also be necessary to include them all, and hence if "diminution of sight" be necessary to the definition, the difficulty of walking alone, or the white pupil apparent to the observer of the eye, would be of equal importance to its completeness. Conciseness is the chief requisite of a definition; and when the pathological condition of the disease is known, it is immediately derived therefrom. Symptoms are only resorted to when this condition is not ascertained. In cataract it has been but partially discovered, and surgeons therefore define the disease "opacity" &c.; but if it were proved to consist always in an *inflammatory* action the definition would simply be, *inflammation* of the lens, &c. For these reasons I have restricted my definition to a statement of the parts involved in disease, and of that principal change without which the affection cannot exist.

Derivation.—The name cataract is derived from the Greek word *catarasso*, to confound or disturb, because the disease interferes with vision.

Divisions.—The number of circumstances under which cataract occurs has given rise to a variety of classifications. These have been founded upon the relative importance which authors attached to certain features of the disease. An arrangement which would early suggest itself is that of the *simple* form, when only the lens and capsule are implicated, and the *complicated* where it takes part with some more general affection. This method has been superseded. The term *spurious*

cataract was introduced by the celebrated Beer, of Vienna, and applied to matters effused in the posterior chamber, before the lens, so as to resemble cataract. But this term is discarded, as whatever is not an opacity of the lens or capsule is not cataract at all. Another division is that of *mature and immature* cataract, signifying that the opacity has, or has not, proceeded to its utmost extent. This is of no other importance than that it shows the existence of two such states.

A classification, which is much more interesting, as it gives an idea of the origin of the disease, consists of four varieties, the *spontaneous*, the *sympathetic*, the *traumatic*, and the *congenital* cataracts. The first arises without any known cause and is also called *idiopathic*. The second occurs in company with other deep-seated affections of the globe; the third is the result of injuries by external violence, and the fourth is found at, or before, the time of birth. As all these varieties have marked peculiarities, and require corresponding variations in their treatment, the arrangement is one of value and importance. The division of cataract, according to the situation of the opacity with regard to the lens or capsule, is the most in accordance with the present natural system of nomenclature, that of naming a disease according to its pathological condition; and dividing it, according to the tissues in which it occurs. Hence, the classification of cataract into 1st, *capsular*; 2d, *lenticular*; and 3d, *capsulo-lenticular*—as it affects the capsule, the lens, or both together, is that now generally received. It is the more important, as it is of the greatest consequence in practice. The capsular, and lenticular cataracts have each several species, which I refer to their respective heads.

Description.—When an eye which contains a simple, mature cataract is examined, the first appearance which attracts the attention, is a white, or yellowish white spot, occupying the pupil, and intercepting to a greater or less extent the passage of light to the retina. In every other respect, the eye appears natural; there is no increase of vascularity in the external tunics; the iris possesses its proper form and action; no pain is

experienced, and the only complaint of the patient is his loss of sight. This white spot is found, on closer inspection, to be situated immediately behind the iris ; and is the opaque lens and capsule. That it is in no other situation, is immediately proved by looking at the eye obliquely, by which means, any opacity of the cornea will be detected, the corneal opacity being then seen quite superficial, and preventing a distinct view of the iris opposite the side examined. It is no deeper, for the vision of the observer is arrested at the pupil. This opacity does not entirely prevent vision. It will be found that the patient can distinguish light from darkness ; perhaps can point to the window, and if the fingers be passed before his eye while so doing, will perceive that something dark has moved before him. In general, he will only distinguish light, the amount of which he can perceive depending upon the density of the cataract and the dilatation of the pupil. The state of the pupil is of great importance in the examination of a cataract, for however great the opacity, some rays still penetrate it, and consequently the greater the space for their admission the more the patient can perceive. Some useful experiments may by this means be made to prove its existence. If the patient be turned from the light, the pupil enlarges to admit a greater number of rays, and he perceives more light than when he looks in the direction whence it comes. For the same reason, he will see better towards evening, than by mid-day. Artificial dilatation of the pupil may be effected by means of the stramonium, or belladonna, and this may be done to such a degree that the patient sees with comparative distinctness. In some cases it obviates the necessity of more radical treatment. The perception of more light after its use, is always evidence that the opacity is a cataract. With the exception of this variation of sight from the contraction of the iris, the condition of vision is always constant ; and its diminution in the progress of the disease equally so, depending solely upon the increase of opacity. Such is cataract in its simple state.

The first indication of its commencement is a cloudiness, or

mist observed before the eye, and obscuring vision. When at this early period, the eye is examined, a slight, diffused haziness may be observed behind the iris; having a bluish white appearance. If now the patient look at a candle, it appears dim, and has a halo around the flame. This halo, in cataract, is always the same, being only an appearance of the radiation of light from the candle. From this time, the diminution of sight continues gradually, and regularly, to increase; and the nebula perceptible in the eye, becomes more white and dense until the cataract is fully formed. The duration of the process is extremely variable. A perfect cataract may be formed in three days, or the patient may be conscious of a gradual diminution of sight for several years. Neither are both eyes simultaneously affected; one eye may remain always sound: and when both are the subject of disease, the affection in the one generally commences when the cataract in the other is quite or nearly mature. The progress of the disease is frequently so mild, and gradual that the patient is unconscious of a diminution of sight in the affected organ, until told that something is growing in his eye, he is induced to close the healthy eye in order to detect it. It is not, however, invariably so. The disease is sometimes ushered in with acute inflammation. In this case it is accompanied with iritis. The patient is conscious of some pain and fulness in the eye; sometimes there is pain in the head; the pupil is sluggish; the vessels of the sclerotic are enlarged where they penetrate that coat near the cornea, and the white zone, which occurs around the cornea in iritis, may be seen. The mist is now observed before the eye, and increases rapidly in density.

Mr. Stratford, of the London Dispensary for diseases of the eye, states that if the organ be now examined with a magnifying glass, vessels may be seen ramifying on the anterior capsule, forming a perfect network, and depositing fibrin either in its centre, or along their course. If the disease be checked by active treatment, it may subside, leaving the capsule in this state; or the severity of the symptoms may abate, and a slow

deposition of fibrin take place until a perfectly opaque cataract be formed. This leads me to the variety of appearances which the cataract may assume, depending upon the manner in which fibrin is deposited, either in the lens or capsule; and also, upon the duration of the disease. The opacity may exist in the capsule, in the lens, or in both; constituting the division into capsular, lenticular, and capsulo-lenticular. In each of these situations, its appearance is modified. The cataract also differs in density, and this circumstance also affects its appearance. These states it is necessary carefully to discriminate, as the treatment of the disease depends upon them.

Capsular Cataract.—Disease of the capsule, in general, soon affects the lens, and consequently the capsulo-lenticular variety is the most common. Still, opacity of this part may exist alone. It may also be confined to the anterior capsule, or the posterior; the cataract being then named in accordance, *anterior capsular*, or *posterior capsular*. Sometimes both portions are involved; and the term *complete capsular* is then applied to the cataract. The opacity of the lens and capsule is owing to the deposition in their texture of white fibrin from vessels which naturally convey and secrete a colorless fluid. The vessels of the capsule ramify freely on its surface, some forming inosculations, and some terminating in exhalents. In disease, fibrin is poured out more abundantly by some than by others, and sometimes is deposited in the centre of the capsule, and at others near its circumference; again, it may thus become arranged in striæ, in spots, in angular figures, or like the veins of marble. This gives rise to the various species of capsular cataracts which are enumerated by authors. There is the *cataracta marmoracea*, or *variegata*, in which the lines on the capsule run in a variegated manner—the *c. punctata* or *stellata*, or mottled deposition—the *c. fenestrata*, where the lines are like the bars of a window—the *c. striata*, or streaked—the *c. dimidiata*, in which one half the capsule is opaque—the *c. trabecularis*, where a single thick bar extends across the capsule—and *c. centralis*, where a white spot is seen directly in the centre of the capsule. Various changes

which the cataract undergoes in the course of disease, has also given rise to other species. Hence the *c. pyramidalis*, in which a dense mass projects into the pupil. The *c. arida siliquata*, or dry-shelled cataract, in which the lens having been absorbed, the two capsules come in contact, and present a thickened and shrivelled appearance. Sometimes by this means the capsule becomes separated from its adhesions, and may be observed to tremble; this is the *c. tremula*: occasionally it slips through the pupil, and moves about in the aqueous humor; and is then called *c. natatilis*, or floating. The *c. gypsea* consists of a change of the capsule into a cretaceous yellowish shell. In the progress of disease, the cataract sometimes comes in contact with the iris; and after a period of time again retires, but carries with it some of the coloring matter from the uvea which gives it a brown appearance. This variety is called *c. choroidalis*.

In the early stage of anterior capsular cataract, it may be distinguished from lenticular cataract by the striated appearance of the opacity, and the transparent spaces between the striæ. The opacity usually begins at the circumference of the capsule and runs in shining, glistening streaks, towards the centre. Their color is nearly white, and becomes more apparent when the iris is contracted by stramonium. When the capsule is entirely opaque, the appearance is dull. The cataract approaches the iris so closely as to obliterate the posterior chamber, and appears directly in the pupil. Sometimes the iris is pressed forward. As the lens is generally at the same time cataractous, it may be seen through the capsule of a different color. The membrane is usually thickened, and hence the cataract appears full and large.

Posterior capsular cataract may be recognised from the former, by the evident deep situation of the opacity. The nebula, though probably striated, has not the bright glistening appearance it possesses when situated anteriorly. The action of the iris is perfectly free, and the posterior chamber, or a space behind the iris, may be recognised. The opacity is dim, deeply

situated, and has a bluish white appearance. It often happens that a patient complains of imperfect vision, but on looking into the eye no opacity can be discovered. When, however, artificial dilatation is employed, some faint spots, or striæ are discovered near the outer margin of the capsule. If deep seated, they appear dim, and however faint, sufficiently account for the loss of sight. The gradual manner in which the opaque spot is shaded towards its edges until it blends with the transparent capsule, renders it impossible to judge how far the nebula extends; and the shading makes the central spot appear less deep than it actually is. The posterior, like the anterior capsular cataract, seldom continues long without involving the lens.

Lenticular Cataract.—This variety differs from the capsular in color, in density, in depth, and in size. It is that form to which the old are subject, and that, likewise, which constitutes the congenital cataract. Both senile and congenital, may also include the capsular opacity. Lenticular cataract is generally gradual in its formation. The opacity commences in the centre of the lens: and, early in the disease, the use of stramonium to dilate the pupil, almost entirely restores the sight. The deposition of fibrin taking place in the centre or nucleus of the lens, increases its density, and as it gradually extends towards the surface, the several layers are rendered harder than natural. The cataract thus formed is small, compact, and hard. It is distinguished by an amber, or yellow color, and appears deeply situated. An evident space exists between the iris and the opaque spot. A black ring is often seen around the pupil, which is differently accounted for. It is most frequent in blue eyes. Some authors consider it an eversion of the margin of the iris, by which the uvea becomes visible in consequence of pressure. Others state that a black ring always exists around the inner margin of the iris, but is not observed on account of the blackness of the pupil. When, however, a cataract is formed, the white ground behind the iris brings the ring in view. If now the pupil be dilated by stramonium or belladonna, the depth of opacity, and the amber color diminish towards the circumference,

owing to the lens being there thinner than at the centre. This is a useful diagnostic in distinguishing lenticular and capsular cataracts. The lens in this state is without vitality, it therefore soon acts upon the capsule as a foreign body, and creates irritation, or inflammation, with consequent opacity. It is thus very rarely that cataract remains confined to the part in which it originates. Lenticular cataracts are not always firm in consistence. They are frequently soft or fluid; and in different cases vary considerably in their degree of fluidity or hardness. This circumstance has occasioned a division of them into several species. These are *cataracta dura*, or *tenax*—*c. fluida*—*c. caseosa*, in which it has the consistence of cheese, and *c. gelatinosa*, that of jelly. The *c. fluido-dura* is that in which the nucleus of the cataract is hard, while the external portion is soft. An exception to the usual nature of lenticular cataract sometimes occurs in the *c. radiata*. In this variety, radii or striæ are seen shooting in every direction from the centre of the lens to the circumference. They are sometimes most apparent at the centre; and at others, only perceptible when the pupil is dilated by stramonium. The completion of this form usually occupies several years.

The congenital cataract comes to maturity more rapidly, and hence does not allow the humor to become so hard, and firm, as in the affection of the old. The cataract remains soft, and never acquires a deep amber color. It appears large, is of a bluish white color; and is without striæ or spots. The transparent membrane investing it, produces a smooth polished surface. The general aspect of the cataract is nebulous. The opacity is deeper in some places than in others, but is diffused, and without any transparent space between the denser parts. The cataract is sometimes so soft, that it is flocculent, and if the eye can be kept perfectly quiet for a few moments the denser flocculi subside. The congenital cataract appears to have a more rapid, and definite course than any other variety. The lens by some means become detached from the capsule, and thus losing its source of nourishment, dies. It then acts as a

foreign substance, irritating the capsule, and producing an increased secretion of the Morgagnian fluid. This fluid, in its turn, reacts on the lens and dissolves it, or promotes its absorption. At the same time the irritation produced in the capsule renders it, likewise, opaque. The cataract, enlarged by the increased secretion and by the thickening of the capsule, presses forward the iris, and appears to project into the anterior chamber. At this time a change takes place, the solution of the lens is finished, and the fluid begins to be removed by absorption. The cataract retires, and diminishes in size, the iris regaining its natural situation. As absorption proceeds, the capsule contracts and shrivels until at the end of the process it remains a mere membrane. It may by contraction be separated from the ciliary processes; and a dark ring is then sometimes observed around it, owing to the choroid membrane being visible through the space. A trembling or vascillating motion of the iris is in such a case occasionally observed, attributed by Mr. Stratford to the loss of support suffered by the iris from the absorption of the contents of the capsule.

Capsulo-lenticular cataract. This is the common form in which cataract usually exists. It is recognised by its large size; its position immediately behind the iris, obliterating the posterior chamber; and by its mixed color. The cataract appears to occupy the pupil; sometimes it encroaches upon the iris, projects it forward, and causes its partial contraction. When the iris is artificially contracted under such circumstances, it relaxes again very slowly, and with difficulty. The thickness of the opaque substance renders the transmission of light so difficult, that the patient scarcely recognises it. In its color may be discovered that of the preceding varieties in their separate state, viz. a superficial white, cloudy, or radiated appearance, like mother of pearl; and a deeper yellowish or greyish tint, sometimes approaching to an amber color, which is the opaque lens. The color of these cataracts, however, is liable to great variation. It may consist entirely of a bluish white, or light grey color; or in some cases may be of a deep brown. Mr. Lawrence states

that he has never seen a cataract of a deeper color than that of mahogany, but in the German authors black cataracts are described. The brown variety is very rare, and indicates great hardness of the lens. The nearer the color approaches a milky white, the softer the cataract may be considered. It will be difficult, however, to form a diagnosis of these varieties from mere description. They require great minuteness of observation and a well-trying experience. The only advantage of the diagnosis is the variation of treatment to which it leads.

Traumatic cataract is an interesting variety of the affections of the lens and capsule. Its marked peculiarities render it worthy of separate notice. These are its rapid formation with acute inflammation; its occasional spontaneous disappearance; its dislocation in many instances to various parts of the eye; the irritation and inflammation it occasions in such situations; and the nature of the treatment required for its cure. Traumatic cataract may originate in two modes; from an injury which produces concussion of the globe, without laceration of its textures; and, secondly, by a penetrating wound of the globe in which the capsule or lens is ruptured. The former, or cataract from concussion, may ensue from a blow received on the forehead, or over the eye; or from a blunt instrument being thrust against the ball. It has been known to arise from a spent shot which has struck the eye without penetrating its coats. Unless the injury has been very severe, producing general inflammation, glaucoma, or amaurosis, the cataract seldom forms immediately. After the lapse of several days, or perhaps weeks, the person begins to experience some uneasiness about the eye, as slight pain, or sense of fulness and distention, and also complains of seeing obscurely as through a mist. If the eye be now examined, the commencing opacity will be discovered, which proceeds with greater or less rapidity, and with its usual symptoms, to the formation of a perfect cataract. Sometimes the iris participates in the disease, and appears thickened and sluggish; or it may contract and adhere to the capsule. The symptoms are occasionally more severe, and their progress more rapid. The

lens and capsule may be involved in disease with the other textures, and from the severity of the concussion, the capsule may be ruptured, the lens be dislodged, and falling into the anterior or posterior chamber, prove a new source of irritation. Mr. Travers mentions a case in which suppuration took place within the capsule after an injury without laceration, but accompanied with much acute inflammation. A globular cataract projected the iris against the cornea, and evidently consisted of the lens involved in purulent matter. After a time both lens and pus were absorbed by the use of mercurials, and only a capsular cataract remained.

There are a variety of displacements to which the lens is liable when dislocated from its capsule, either by the immediate concussion, or in consequence of the supervening inflammation. Thus it may fall into the posterior chamber, and be partially concealed from view. It usually, however, slips through the pupil and occupies the anterior chamber. The lens has been known to enter the anterior chamber transparent, and remain there in that state for a length of time. In general it is opaque, and acting on the delicate iris as a foreign body, produces iritis. Sometimes the lens remains in the anterior chamber without causing inflammation, and is finally absorbed. Though a capsular cataract commonly remains after such cases, it is now and then absorbed, and vision is recovered. Instead of passing into the anterior chamber, the lens may come in contact with the iris and thrust it forward against the cornea. This case always produces severe iritis, and general internal inflammation ; and demands the immediate removal of the lens by a surgical operation. Again, the rupture of the capsule may not occur until disorganization have taken place in the vitreous humor, when the lens may fall backward, sink out of the axis of vision, and be absorbed. The sight of the patient is sometimes restored, but in general, it is destroyed by the existing glaucoma. Mr. Mackenzie, from a number of whose cases in the *Medical Gazette*, vol. 9, page 3, I have collected these varieties, states that by some injury, probably a lacerating one, the lens

has got through the choroid and sclerotic coat, and has been discovered under the conjunctiva.

2. The traumatic cataract, from direct injury of the capsule and lens, is formed immediately on the receipt of the wound. It is not always accompanied with acute symptoms, but these parts cannot be wounded without opacity being the result. Generally violent inflammation is the immediate effect. The wound may pass through the cornea, or the sclerotic coat, and is generally made by some pointed instrument. Frequently bits of iron or stone, which fly in cutting these materials, strike the cornea, where they are commonly arrested; but they sometimes penetrate it and enter the capsule either through the pupil or through the iris. A speck of iron has thus been driven into the capsule and remained there without occasioning inconvenience until a capsular cataract was formed. In general, immediate and violent inflammation ensues, accompanied with symptomatic fever, and requiring the most active depletory treatment. Suppuration of the lens, with general inflammation of the internal tunics follows, and if the foreign matter be not removed, causes rupture of the globe and discharge of its contents. Sometimes the substance may be seen and be removed by an operation. The inflammation then subsides; the sequel of the case depending upon the extent of its ravages.

Secondary cataract is the only variety remaining to be observed. The term is applied to those cases which occur after operations. In the formation of an artificial pupil in the iris, the capsule may be cut, and the consequent cataract is called secondary. But it is usually the result of the operation, called couching, in which the lens is removed from its situation but the capsule remains. It becomes opaque and requires a second operation for its removal. The symptoms and appearances of these are the same as the cases already described.

Complications.—The cataract does not always exist in this simple and isolated state. It is often complicated with other affections. Glaucoma and amaurosis are its frequent concomitants; though the cataract is generally formed subsequent to the

existence of the former diseases. Often, the iris is found adherent to the lens. This may exist to a sufficient extent to prevent any operation for the removal of the cataract, though in general, it is only attached at particular points. Sometimes these attachments are separated, when stramonium is applied to cause contraction of the iris, and the case is then rendered simple. A case is reported by Mr. Travers, *Med. Gaz.* vol. v. p. 671, in which the cataract was projected forwards, and had formed an adhesion to the cornea. There is now at the N. Y. Eye Infirmary an interesting case of cataract, with extensive adhesions of the iris; excessively irregular pupil, though it dilates by the application of stramonium; and opacity of the cornea. The case is rendered more unusual by its occurrence in a very young boy, after severe iritis and ophthalmia. The cataract is capsular and imperfect, there being three circumscribed and distinct specks on the capsule which are white and glistening, forming a strong contrast with the dim and cloudy corneal opacity. There is also a dark brown deposition which is a portion of the uvea. The treatment of the case is directed to remove the corneal opacity. The management of complicated cases is always difficult. In cataract with glaucoma or amaurosis, nothing can be done for its relief until the latter diseases are removed. When adhesions exist the difficulty of an operation is always increased, and such cases are extremely liable to terminate unfavorably.

Diagnosis.—There are a number of the diseases of the eye with which cataract may be confounded. Nor is their diagnosis at all times easy, for those of the most experience and skill have committed errors. As, however, the diagnosis materially influences the future conduct of the surgeon, its correctness is all-important; and with sufficient care may be made exact. The diseases which may be mistaken for cataract are amaurosis; glaucoma; fungus hæmatodes; opacity of the cornea; and adventitious deposits in the posterior chamber, and before the crystalline humor. In all these diseases an opacity is perceptible in the interior of the eye; but they all possess certain peculiarities by which they may be distinguished: or if their

appearance approach so nearly to that of cataract to render the distinction doubtful, the history of their origin and progress will decide the question.

Cataract and Amaurosis.—In some forms of amaurosis an organic change takes place in the condition of the retina, attributed to a deposition of fibrin within its naturally transparent texture. This causes an opacity which is apparent on examination, but which differs from that of cataract in appearing very deeply situated in the eye. It is seldom very dense like cataract, but a dim, diffused cloudiness is seen behind the pupil; and if this be dilated by stramonium the patient's vision is not improved. With this opacity, insufficient in its apparent density to account for great diminution of sight, vision may be entirely lost; and if the disease exist in both eyes, the patient may be involved in total darkness. In cataract, light is always perceptible. Where the sight in amaurosis is still retained to some extent, the diminution is not proportionate to the opacity; and now an important symptom is manifested. If a strong light be presented to the eye, vision is improved, owing to the powerful stimulus given to the sensibility of the retina. Persons having cataract see more distinctly by a very moderate light. There is a peculiar difference in the appearance of the flame of a candle in those affected with cataract or amaurosis. The flame appears to an amaurotic eye, surrounded with a halo of various colors; while the halo in cataract is always white, appearing composed of rays of light radiated from the flame and somewhat obscured by mist. The sight in amaurosis is not constant. Though it continues to decline, if the disease be not checked, it is subject to fluctuations, being sometimes worse, and at times improved. This is not invariably the case. Sometimes flashes of light dash across the eye, and colored spots, or images float before the sight. This is not the case in simple cataract. Assistance may be derived from the state of the other eye, for if its pupil be perfectly clear, but the eye be amaurotic, the inference may be that in the suspected eye there is also amaurosis. Again, the condition of the iris constitutes

a valuable diagnostic. The iris in amaurosis may be either preternaturally contracted or relaxed; and in either state may be motionless; it may be sluggish in its movements, or may retain its natural action. It seldom remains perfectly natural. When, however, the pupil is thus dilated or contracted, and this state is not manifestly owing to a cataract of unusual size coming in contact with it, it is evident the disease is amaurosis, (or glaucoma). Were these distinctions insufficient, the accession, and progress of the affection, in the course of which the opacity was produced, would determine its being cataract or amaurosis. I have said that cataract was formed, except in some traumatic cases, without derangement of the general health. The contrary occurs in amaurosis. This disease commences with an increased sensibility to light; and clearness of vision, which is, however, of short duration, and is succeeded by diminished sight. Pain, frequently of the most agonizing intensity, and violence is experienced in the head or eye. In the more chronic form, a severe, but dull pain is suffered in the forehead just over the orbit, or it may be confined to the globe of the eye. It is always of an obstinate character. Amaurosis, however, frequently occurs without its presence. Pain in the head, or a deep-seated pain in the eye infallibly indicates that the opacity in question is not cataract; or, if it be proved from other reasons that the eye contains a cataract, that it is complicated with other internal disease of the organ. The acuteness of the amaurotic inflammation, or the continued pain in the head, seldom fail to derange the general health, and this derangement is usually manifested in the digestive organs. Amaurosis is likewise a frequent consequence of such disorder: thus it, together with the resulting pain in the head, often precede by several months the disease in the eye. However this may be, derangement of the digestive organs, occurring in conjunction with the pain in the head, together with the local symptoms enumerated, is an important auxiliary in determining the diagnosis.

Cataract and Glaucoma.—Glaucoma is an inflammation,

either acute or chronic, of the vitreous humor, in which its transparency is lost. The opacity thus produced may be mistaken for cataract. Its gradual increase causes obscurity of vision, as in the formation of the latter disease ; but it differs from it in color, in apparent volume, and in depth of situation. The commencement of the disease is attended with pain either in the eye, or forehead, and it seldom continues long without producing amaurosis, iritis, and cataract itself, with general inflammation of the globe of the eye. The opacity is of a green, or greenish yellow color—very different in this respect from cataract. It appears very deep in the eye, and is sometimes evidently concave anteriorly. The opacity is diffused, like a cloud, but has a shining appearance, so as sometimes to resemble a piece of polished metal in the eye. Occasionally the arteria centralis retinæ may be seen running through it. Notwithstanding that an evident space may be distinguished between the iris and the opaque substance, the functions of the former are generally deranged. The iris becomes languid in its movements ; often, is altered in color and thickness. It will frequently be found contracted, or relaxed, and also motionless. A remarkable effect of glaucoma, in many cases, is to render the iris tremulous ; and, if the vitreous humor be increased in volume, it may be pressed forward so as to appear convex ; or it may even be forced against the cornea. Another important diagnostic is the condition of the globe. In cataract, it remains natural. Glaucoma frequently deforms, renders it soft, and lessens the thickness of the external tunics. A glaucomatous eye appears blue from the choroid being seen through the sclerotic, and large varicose vessels generally run beneath the conjunctiva. Disordered health then ; pain ; loss of sight disproportionate to the degree of opacity, and frequently total blindness ; together with the green color of the opacity, and derangement of the iris, attend this complaint and clearly distinguish it from cataract.

Cataract and Fungus Hæmatodes.—The opacity which

characterizes the commencement of fungus hæmatodes, has too remarkable an appearance to be readily mistaken for cataract. The opaque body is seen deeply located in the posterior part of the eye, and has a light yellow color, often approaching that of amber. It appears like a polished metallic disk; often seems concave, and sometimes the iris may be seen reflected upon it. When it has increased in size, its surface is irregular, and by this time sight is destroyed. Its progress is accompanied with fever, and a peculiar languor. The most distressing pain both in the head and eye, attend its course at irregular intervals. When the fungus has arrived at the pupil, its amber color might cause it to be pronounced cataract, did not the history of the case, the loss of sight, the disordered iris, and its occurrence for the most part during childhood, almost preclude the possibility of error.

Cataract and Opacity of the Cornea.—The only condition of the cornea which is liable to occasion an incorrect diagnosis, is a slight nebula, situated on its posterior lamina, and near the centre. Such an opacity has been pronounced cataract. The diagnosis is of much importance, for, on the supposition that the case was a forming cataract, a patient might be directed to wait for its completion, during which time the corneal opacity may become too fixed for treatment, and might have been cured. If the eye be examined obliquely, the superficial situation of the disease will be discovered, while behind it may be seen the iris with a perfectly black pupil. The sight is only obscured, and the eye manifests no other derangement.

Cataract and adventitious deposit before the Lens.—The sequel of iritis is frequently an effusion of fibrin or purulent matter in the posterior chamber, where it appears like a membrane, and may be mistaken for cataract. Such depositions have been termed *false cataracts*. They are either of a white or yellow color, and appear dull, and irregular. The iris is generally adherent to them, and presents marks of having suffered from disease. At times, these deposits project into the

anterior chamber, and then become more easily recognized. An effusion of blood in this manner has been seen, the deposit appearing white, with red spots scattered on its surface.

Causes.—The known exciting causes of cataract are numerous, and for this reason the disease is not an uncommon one. It may arise from injury, either direct or indirect, inflicted on the lens and capsule by external violence. The presence of a sense of fulness and distention in the eye during its formation, shows it sometimes to result from congestion of the organ. An extension of the inflammation in iritis, amaurosis, &c. to the capsule of the lens, is often its cause. Too constant use of the eye in literary pursuits, or in such of the arts as require minute and long-continued inspection, particularly if with this an unusually strong light be employed, however unaccountable its action on the lens may be, yet frequently gives rise to cataract. The affection as it occurs in old persons, or the senile cataract, is frequently insidious, and slow in its approach, requiring several years for its completion, and happens to those in other respects so perfectly healthy, that it cannot be attributed to any known cause. Not a few cases are also on record where the disease was hereditary; in some of which as many as five of a family have been affected. I have seen Dr. Delafield operate on two of a family at once, for congenital cataract, in which all the children had been born with the disease. Mr. Stratford, of London, states that congenital cataract frequently occurs after protracted labor; and considers, that in the compression which the frontal bone experiences, the globe must also be compressed, by which means the delicate vessels attaching the lens to its capsule are ruptured, and cataract consequently ensues. In thus explaining congenital cataract, he states that it may also result from local chronic inflammation. It may not be an altogether fanciful conjecture, to imagine, that this cataract is sometimes the consequence of the rupture and absorption of the membrana pupillaris. The arteria centralis retinae, which gives branches to the capsule of the lens, also in the fœtus supplies this membrane. The increased action which

takes place by the rupture of these branches, and by the absorption which is going on, may occasion a slight deposition of fibrin ; and, an obstruction once created in the course of the vessels, would cause total opacity of lens and capsule.

There appears much reluctance in the writers on cataract to consider it the result of actual inflammation and the terms "acute" and "chronic inflammation," or "irritation," as they are applied to other diseases are seldom used. But traumatic cataract clearly shows that acute inflammation may occur in the lens and capsule, as well as in the other tissues of the eye ; while the result of the inflammation is a cataract similar in its formation and appearance to that whose progress is almost imperceptible. When also, the disease is not the consequence of external injury, its course is sometimes attended with a manifest sense of fulness and distention, or even pain, in the eye. Again in the cases where the cataract is rapidly formed, if the pupil be examined with a magnifying glass, vessels may be seen ramifying over the capsule, which in the healthy eye are invisible ; proving an increase of the circulating fluids of the part. These fluids are naturally transparent ; but in disease, they are denser, or acquire a more or less white color. The increase of volume which the cataract sometimes possesses over the natural size of the capsule and lens, must be the result either of deposition of fibrin in their texture, or of an increased secretion of the fluid of Morgagni ; while, in other cases, the gradual absorption of the contents of the capsule, until only a shrivelled membranous or capsular cataract remains proves that all the results of inflammation in other parts, viz : deposition of fibrin ; preternatural secretion ; and subsequent absorption, also take place here. The low degree of vitality attributed to these parts by some authors, renders them, they think, insusceptible of inflammation ; and some affirm that the lens has no vitality. But can a body possessed of such a perfect organization, and wherein the natural processes of exhalation and absorption, must continue with the most undeviating exactness, to preserve the transparency of these delicate parts have a low degree of vitality ? or rather,

must not these functions possess a very high degree of vitality to continue their healthy condition, notwithstanding the frequent abuse of the organ from exposure, and improper or excessive employment? And if they possess this vitality, together with unusual delicacy of structure, are they not also liable to all the derangements to which all other highly organized parts are subject? If acute inflammation can occur in the lens and capsule, as proved in traumatic cataract, chronic inflammation may also take place, because wherever the acute form has been known, the subacute has also existed. And the pathology of both are essentially the same. In regard to the senile cataract, may not a slow deposition of fibrin take place in the lens, in the same manner, and by the same morbid action, as occurs in the deposition of bone in the arteries of old persons? If the production and developement of miliary tubercles in the lungs is sometimes so imperceptible that no idea of their progress can be formed, and they are allowed to be the result of chronic inflammation or irritation, I should imagine the same tardy action in the vessels of the lens and capsule might occasion an equally slow production of cataract. The *exciting* causes then being ascertained, and the *proximate* cause, or in other words, the disease itself being understood, as much, I believe, is known of the cause of cataract as of any other disease.

Prognosis. The treatment of cataract has contributed much to enhance the reputation of surgery. So rapid and palpable is its effect, and so perfect the relief afforded, that it cannot but be beheld with wonder and admiration. The ingenuity to devise, and the boldness to execute the operation called couching must have elevated Celsus, who first performed it, to the highest place in the esteem of his countrymen, and of his profession.

Nothing is available in the cure of cataract but a surgical operation, and that may be completely effectual. To those however, accustomed to imagine a far less injury to the eye than is produced by plunging an instrument to its centre, as fatal to vision, the surprise at the proposal of an operation is

only equalled by their dread of its severity. Such are in consequence extremely solicitous to know its result; and if their joy and happiness in its success be great, their disappointment at its failure is still more manifest. In its event, therefore, the reputation of the surgeon is greatly concerned: and his duty, so far to warn his patient of the dangers which surround him, and of the liability of the operation to failure, as not to deter his attempting the last expedient, without affording a too flattering prospect of relief, is delicate and difficult in the extreme. Yet this is the only just, and proper course. The complications of the disease are numerous, and the result of an operation is always involved in uncertainty. To the inquiry if the cataract will not disappear without an operation, the reply may be given, that when once produced, it always remains. It is true that a few cases are known where spontaneous cure occurred, but such, only go to prove the general rule. The most, likewise, of the reported cases are those of traumatic cataract in which accident rudely executed what the surgeon would have performed with more neatness. A more genuine instance of spontaneous cure is reported by Mr. Estlin of Bristol. *Med. Gazette*, vol. 3, p. 566. A simple mature cataract occurring in a person whose habit is rather spare, and who leads a temperate life, is the most favorable for operation. But little doubt of success need here be entertained, and it is fortunate for surgery that, as I am informed by Dr. Delafield, the great majority of the cases of cataract which occur in practice are free from complication with other diseases. It is unadvisable, however, to operate where only one such cataract exists, for though the event be satisfactory, the sound eye will alone be used. The only reason for exposing the person to the dangers of inflammation which may follow the operation, being the improved appearance of the face. Mr. Travers' advice in this case is to operate, his reasons for which, he gives in his work on the eye, p. 338, but it has been overruled by other authority.

The removal of such a cataract in a plethoric person, or one whose constitution is broken, whose health is deranged, or

whose habits are intemperate, is attended, even after careful preparatory treatment, with much liability to inflammation from the incision, and the injury done the internal parts of the eye; and of this the patient should be forewarned. Indeed, if the general health be deranged, no operation should be attempted until measures have been taken to repair it. Derangement of the stomach and bowels; a rheumatic diathesis; the presence of pulmonary catarrh; or eruptive diseases, all tend to occasion an unfavorable termination, and should therefore modify the prognosis. The existence of hæmorrhoids, or of obstinate constipation, are also enumerated by Dupuytren, as reasons for deferring an operation. On the other hand, if a perfectly formed cataract exist in one eye, while the other is affected by the incipient disease, an operation should be performed, that the individual may not be deprived of sight during its completion. Where two mature cataracts exist, one only should be removed at a single operation. The practice of some surgeons, at once to remove both, exposes the patient to a greater danger of subsequent inflammation; or, if by untoward circumstances, the operation fail, there is no further resource, unless a secondary operation be practicable. In complications of the cataract with other local diseases, the prognosis is always unfavorable. If amaurosis, or glaucoma be present to any extent, an operation is not only useless, but reprehensible, from the great liability to excite violent inflammation where disease already exists. It is said that in mild cases of amaurosis, when the progress of the disease is arrested, and the retina retains some sensibility to light, the cataract may be removed with advantage. If, however, in such cases the patient were informed of the danger of supervening inflammation, the only partial relief he will obtain, and the probability that his sight would always be weak, and insufficient, he would generally decline an operation. The eye is frequently subject to rheumatic inflammation, which locates itself in either the sclerotic coat, or the iris. Where this disposition prevails, the removal of a cataract is extremely liable to excite, or renew the disease in these tunics. This is not, however,

a sufficient reason to prevent an operation and consign a patient to blindness. If due preparatory treatment be used ; care be had to meet with active remedies the least sign of subsequent inflammation, and the patient be advised of the hazard, it may be attempted with propriety. Extensive adhesions of the iris to the capsule of the lens should forbid an operation, for the lesion produced in the attempt to detach it would not fail to cause destructive inflammation. When, however, the attachments are slight, as by single shreds or points, and the pupil is fully dilated by stramonium, a skilful surgeon will readily divide them, and remove the cataract. Opacities of the cornea, occurring in conjunction with cataract, must be removed, if possible, previously to an operation. It is in some such cases that the eye displays the great extent to which it will bear surgical operations, and also the great recuperative powers of the system. Sometimes the corneal opacity may be removed by medical treatment from all but the centre of the membrane, the cataract may be dislodged, and finally the operation to form an artificial pupil, may be successfully accomplished. If the corneal opacity be great, operations upon a cataract are obviously without advantage. In congenital cataract, a favorable prognosis may always be given. The injury inflicted by the operation being slight, the liability to consecutive inflammation is diminished ; the cataract is soft, and being broken up, presents ample surface for the action of the absorbents ; while the great activity with which the vital functions are performed ensures its rapid absorption. The prognosis of the traumatic form must necessarily be uncertain. If it arise from concussion, some other disease will generally accompany it. When it is the result of a direct injury, and the lens is dislodged, an immediate operation may be necessary, but its result, in regard to sight, must depend upon the degree of injury primarily inflicted, and the event of an additional wound in an already inflamed organ. Where the cataract exists after the subsidence of all inflammation, and there is no other complication present, it may be removed with a sanguine hope of success. It is frequently necessary to repeat

the operation in consequence of incomplete absorption, or of the formation of a capsular cataract after the lens has been removed, and in giving an opinion upon the result of an operation, this should always be clearly stated.

Another source whence assistance may be derived in estimating the probable success of an operation, is the comparative result of previous experience. The practice of Dr. Delafield has led him to estimate the proportion of successful operations at about six in seven cases. This is not, however, the proportion of cures without supervening inflammation. In rather more than one half the cases, he thinks, inflammation occurs subsequent to an operation, and this is only removed by the most active treatment. In fine, then, the prognosis of a simple idiopathic cataract, as the congenital or senile, may be as favorable as the usual certainty of operations will allow. The symptomatic, or that resulting from other general or local affections, offers less hope of perfect relief. The complicated cases depend upon the extent of internal disorganization ; and the traumatic varieties are involved in uncertainty, in which the judgment of the surgeon must be exercised according to the individual peculiarities of the case.

Treatment.—It is now universally admitted, that no treatment is of any avail in the cure of cataract, but its removal from the axis of vision by a surgical operation. Recurrence, therefore, to the various modes of medical treatment, which have been attempted, as the use of narcotics, stimulants, and counter-irritants is unnecessary.

There is no operation in surgery which involves more medical and surgical skill, than that for the removal of cataract. Minute anatomical knowledge, an extensive acquaintance with therapeutics, combined with the greatest skill and delicacy in surgery, are here in requisition. The utmost quickness of perception to detect the accidents which threaten every step of the surgeon's progress, must be combined with the most prompt and dexterous execution to counteract their occurrence.

No case of cataract presents itself which is prepared for im-

mediate removal. A preparatory treatment of greater or less extent, according to the condition of the system, is always required. The great liability of the eye to severe subsequent inflammation, demands the closest attention, and often the decided energy of the surgeon. Indeed, it has been remarked by Dr. Delafield, that the success of an operation is as much dependant upon the preparatory, and subsequent treatment, as upon the operation itself. The treatment of cataract is hence subject to three divisions. 1st, the preparatory treatment ; 2d, the operation ; and 3d, its subsequent management.

1. The indications for preparatory treatment are derived from the temperament of the person, the general health, and the local condition of the eye. A simple cataract appearing in a spare habit, and a sound constitution, is in the most favorable state for operation. The only treatment which need here premise it, is an abstemious diet for a few days ; attention to the digestive organs ; and venesection the previous evening if there be the least pain, or sense of fulness about the head or eye. It is always important that one or two active cathartics be given at the outset, and that the bowels be then kept in a free condition by milder aperients. Venesection the preceding evening or morning would probably seldom be injurious, unless debility exist, and is frequently necessary. When the consequences of insufficient preparation are so dangerous, the fear of doing a little too much need not be dreaded. There is less liability to subsequent inflammation, and the surgeon proceeds with more confidence. Plethoric persons and those disposed to determination of blood to the head, require active depletion. Venesection should be repeated several times, strict diet be enjoined, and a cathartic be administered every two or three mornings for a couple of weeks previously to the operation. And notwithstanding all this reduction, inflammation is very apt to supervene.

If, together with this habit of body, the health be impaired, as indicated by a furred tongue, deranged digestion, and diminished or capricious appetite, the use of evacuants, regulated according to the condition of the bowels, is of the highest impor-

tance. The health must be restored by several weeks' strict attention to a proper diet. In such cases, calomel in small doses, or the pil : hydrarg : taken at night, and followed the next morning by sulph : magnes : alone, or with senna; or the eccoprotic mixture are preferable to drastic purgatives. The warm bath to excite a healthy action in the cutaneous vessels, may be in many instances productive of advantage. By these means, the tongue will resume its natural appearance; the appetite, and digestion be restored; and a manifest improvement is often observed in the disposition, and countenance of the patient. When this derangement of health occurs in more weak, and nervous constitutions, the same treatment, exclusive of the free loss of blood, is indicated.

The presence of any rheumatic affection is a serious obstacle to success, and an operation should be delayed until all the symptoms are removed by appropriate treatment.

A rheumatic diathesis is always unfavorable to operations on the eye. The wound is extremely liable to excite the peculiar inflammation of rheumatism in either the fibrous sclerotic coat, or in the iris. On this account the state of the weather should be carefully regarded in determining the time for operations. Indeed, the remark may be extended to all persons, without confining it to the rheumatic. I saw the result of an operation during the last winter held a long time in doubt from an unavoidable exposure to cold. The patient being obliged to remain in a cold room, after having undergone active preparatory depletion was attacked, after the operation, with extremely severe internal and external ophthalmia. It obstinately resisted both general, and local depletion, as well as mercurials, and counter irritants, until the patient was removed to a more comfortable apartment. The disease then rapidly yielded to treatment.

The failure of some cases has been clearly traced to the existence of eruptive diseases. If, therefore, any such be discovered, they should be subjected to treatment before the cataract.

Pulmonary diseases are likewise prejudicial to the treatment.

The act of coughing, they occasion, according to Mr. Dupuytren, produces congestion of the head, which may be the means of exciting ophthalmia.

In regard to the condition of the eye itself, the presence of any inflammation, or irritation about the organ must be completely removed before an operation is commenced, except in cases of traumatic cataract, where the lens acts as a foreign substance to keep up inflammation. Such traumatic cases are only to be operated upon after the most decided depletion. If amaurosis or iritis exist, the remedies employed in those affections must be premised until no trace of those diseases be left. Sometimes a slow disorganizing action goes on in the vitreous humor until the lens loses its support, and falls into the anterior chamber. After a time the disease is recovered from, and the vitreous humor is restored to a healthy state. It is then, that the dislocated lens may, with propriety, be removed. Five or six such cases have occurred to Dr. Delafield, upon which he has operated at this period with entire success. When the health has been thus restored, and the eye reduced to a perfectly quiet condition, the only remaining precaution is to secure an ample dilatation of the pupil by means of the extract of stramonium, or belladonna. This should be applied in a thick paste around the palpebræ the evening, and morning preceding the operation. When used, it should be kept moist for some time to promote its absorption.

2. *The Operations.*—The controversy which the operations proposed for the cure of cataract have occasioned, has elicited the most minute and extended descriptions. Objections, fancied and real, have been advanced against them; and each has been extolled, to the exclusion of the others, by the various writers who have invented them, or practised them with the greatest facility. To describe all these minutiae, to examine and relate the objections, and detail all the precautions enumerated, would only be to make a prolix rehearsal from these authors. I shall, therefore, briefly mention the different operations, and the manner of performing them as now generally received; the

instances to which they are severally the best adapted ; and the instruments at present preferred.

There are three operations by which the cataract may be removed, viz. by *depression* ; by *extraction* ; and by *absorption*.

1. The operation by *depression*, or *couching*, as it is also termed, consists in removing the cataract from the axis of vision by depressing it into the vitreous humor, where it remains until reduced by the action of the absorbents. This method has two varieties, called the *anterior* and *posterior operations* : the former, implying that the instrument is passed into the cataract through the cornea, the anterior chamber of the aqueous humor and the pupil ; the latter, that it is introduced posteriorly to the iris, through the opaque membranes of the eye, and the posterior chamber. The terms are derived from the circumstances of the operation being performed either anteriorly, or posteriorly to the iris. There is a variety of the posterior operation termed *reclination*, in which the vertical plane of the lens is made the horizontal before the depression is commenced. This method is now abandoned.

2. The operation by *extraction* consists in making a section through the cornea sufficiently large to permit the exit of the lens, which is detached from its capsule, and pressed through the incision. Of this operation there are also two varieties ; one, in which the incision is made along the inferior margin of the cornea ; the second, in which it is carried along the superior margin. The flap of the cornea in the former is turned downward ; in the latter it is directed upward.

3. The operation by *absorption* consists in introducing an instrument into the cataract, breaking it up without dislodging it from the axis of vision, and so lacerating the capsule that the aqueous humor is admitted upon the lens, by which means the latter becomes absorbed. This method is also called *solution*, from an opinion that the aqueous humor dissolved the lens. The instrument may here also be introduced anteriorly, or pos-

teriorly to the iris, as in depression. When passed through the cornea, the operation is called *keratonyxis*.

Depression was first performed by Celsus. Extraction was first described by Daniel, though Freytag first practised it in a case where the lens had fallen into the anterior chamber. The operation by absorption was discovered by Messrs. Pott and Hey.

These operations are severally applied to the varieties of cataract, as they prove most applicable to particular cases. In general, depression is preferred in this country, but extraction appears to be the favorite in Europe. Dr. Delafield has informed me that at one time he operated alternately by extraction, and depression, but finally adopted the latter, except in particular cases, from having found it the more successful. M. Dupuytren once gave extraction the preference, but has since given his opinion in favor of depression.

When either of these operations is to be performed, stramonium must be applied to the eye several hours previously, that the fairest possible view may be obtained of the cataract. A situation is then selected near a window, at which a full light enters, without the admission of the rays of the sun. A northern exposure is the best for this object. Strong light should be excluded the room from every other source. The object in the arrangement of the light is to permit as much as possible to strike the eye, but in such a manner that none of the rays reflected from the cornea shall be visible to the operator. If the surgeon operate equally well with both hands, the patient may always sit before him, but if he only use the right hand, the patient must lie down when the right eye is the subject of operation. The surgeon, in the latter case, places himself at the head of the table, on a seat so elevated, that he may easily overlook the patient's face. When the sitting posture is chosen, the surgeon takes a position partially between the light and the patient, having the cataractous eye rather to the right, and the nearer of the two to the window. A pledget confined by a

slight bandage should always be placed over the eye on which no operation is proposed. The patient endeavors to see what is passing before him, and the consequent movement of the eye, being communicated to the other, prevents its being kept at rest. This difficulty the bandage obviates. The seat of the patient should have a back which affords a firm support for the head, though if the surgeon have a steady assistant, he may confine it against his breast with sufficient firmness. The assistant who supports the head, also elevates the lid and contributes to fix the eye. The management of the lid is a matter of nicety. The assistant should first partially raise the lid, with the forefinger of the left hand, to enable him to place that of the right distinctly upon the tarsal edge of the lid, under the eyelashes. He then elevates it to the orbital ridge, and gently presses on the globe of the eye. If extraction be performed, he must not press in the least upon the eye, but simply elevate the lid. When the finger is placed above the eyelashes, instead of on the tarsal margin of the lid, the action of the eye during the operation everts the lid, the fold falls over the cornea, and the surgeon is compelled to withdraw his instrument. When the cataract is to be removed by depression, the instrument used is called a couching needle. That invented by Scarpa, with some modification, is now generally employed. It is about an inch long, with its pointed extremity slightly curved; the concavity being flat, and the convex surface rounded. Just above the curvature the diameter of the needle is somewhat diminished. This instrument is only used in the posterior operation. The anterior, requires Saunder's straight spear-pointed needle.

All the preliminary arrangements being made, the operator takes the needle between the thumb and two forefingers, the second being advanced nearer the needle than the first. The fingers are then drawn back, that the instrument may be passed into the eye, by their action alone, and not by a movement of the hand and arm. If the surgeon's hand be unsteady, he may have a support for the elbow, or may rest the little finger on the patient's cheek bone; but it is always advisa-

ble to avoid such assistance, as it interferes with the free motion of the hand. The instrument is then applied, perpendicularly, to the sclerotic conjunctiva about a line beyond its junction with the cornea. The flat surface of the needle should be parallel with the horizontal plane of the eye, and a little below its centre, in order to avoid dividing the long ciliary artery between the sclerotic and choroid coats. The needle is then passed gently, but firmly and steadily through the membranes, after which the handle is immediately directed backward, if the patient be sitting; downward, if he be lying, until the point of the needle is in the posterior chamber behind the iris. Great care is necessary to avoid wounding or passing the needle through this body. Immediately the needle enters the posterior chamber, its concave surface must be turned towards the cataract. This motion will consequently directly follow the backward, or downward movement previously directed. The point of the needle is now advanced until distinctly seen through the pupil, to the centre of which it is to be passed, when by a prompt action it is thrust through the capsule into the lens. The needle is then in the situation for depressing the cataract. This is done by inclining the handle upward towards the forehead. The lens and capsule are thereby torn from their attachments and forced into the vitreous humor, where they become engaged, and remain. The needle should then be partially removed to discover if the cataract follow it, if so the depressing motion must be repeated until it continues in the vitreous humor. When the cataract is lenticular, the transparent capsule may remain in its situation, and, becoming afterwards opaque, constitute a secondary cataract. To prevent this, the point of the needle should be turned previously to being withdrawn from the eye, towards the cornea, and be freely moved about to lacerate the capsule and thus hasten its absorption. The instrument is then carefully withdrawn, and the assistant instantly lets fall the lid. After a short interval, the eye may again be opened to examine its state, and gratify the patient with a moment's enjoyment of vision. It is then to

be immediately closed, and covered with a slip of muslin, wet with cold water. A bandage is then passed around the head, having a little drop curtain attached which falls before the eye, and excludes the light. The muslin is to be kept constantly wet with cold water, and the patient be placed in a darkened room. Thus terminates the operation.

The parts through which the needle has passed to arrive at the cataract, are the conjunctiva, the sclerotica, the choroid membrane, the retina, the ciliary processes, and the posterior chamber of the aqueous humor. In the depression of the cataract, the hyaloid membrane and the vitreous humor are injured.

The various movements of the instrument while in the eye must be made by employing it as a lever, the fulcrum of which is the membranes punctured by its introduction.

It is seldom that the instrument takes precisely the course described. Instead of passing through the posterior chamber, after penetrating the coats of the eye, and being then plunged into the lens through the anterior capsule, it generally enters the cataract directly it has punctured the membranes, slightly lacerating in its course the hyaloid membrane and the vitreous humor. This is a point of practical importance, for if the point of the instrument in this case be turned backward, as for rupturing the capsule, it becomes more deeply imbedded in the cataract, and the anterior capsule is then liable to remain uninjured when the lens is depressed. When, therefore, the needle is not distinctly seen in the posterior chamber before the depression is commenced, its point should be turned forward towards the cornea to break up the anterior capsule. After which it is again directed upon the cataract to depress it, this accident is particularly liable to happen in pure lenticular cataract, and if the anterior capsule have not been broken, a secondary capsular cataract is the consequence.

If the cataract have been soft, the aqueous humor will be rendered turbid, and portions of the lens will enter the anterior chamber. This circumstance as it prevents immediate vision,

may cause some disappointment ; but these parts are soon absorbed, and the humor again rendered transparent.

The Anterior Operation is seldom employed for depression. It is chiefly confined to the operation by absorption ; and, for the most part, to the congenital cataract. It is much more simple than the former, and consists in introducing the straight needle through the cornea and pupil into the cataract, whence, after being freely moved about to lacerate the capsule and lens, it is immediately withdrawn. The chief precautions to be observed, are to present the needle perpendicularly to the cornea, or it may pass between its lamina and fail to enter the eye : and, secondly, to avoid running the needle through the iris. This is often very difficult on account of the involuntary and forcible action of the globe, by which the needle is diverted from its course. In operating upon children, they should always be laid on a table, and be firmly secured by assistants. The surgeon sits at the head of the table, or by the side of the patient, as suits his convenience. The same directions in regard to the preliminary arrangements, and subsequent management apply to all the operations.

Operation by Absorption.—The mode of proceeding in this operation, is the same in every respect as that for depression, except that the cataract is not removed from its natural situation. The anterior, or the posterior operation may alike be employed. The needle is introduced into the cataract, and then freely moved about to break it down. The congenital cataract is, however, generally and most properly treated by the anterior method. This operation was proposed by Messrs. Hey and Pott, from having observed that when portions of opaque matter obtained access to the aqueous humor, they soon disappeared, and the pupil became clear. It was hence supposed that the aqueous humor dissolved the cataract, but this has been disproved ; and, it is now only known, that the admission of the aqueous humor to the cataract promotes its absorption. The object of the operation, therefore, is to admit this humor to the cataract, exposed to its action by as much of

its surface as possible. The operator may push some portions of the broken cataract into the anterior chamber with advantage. There is less danger of subsequent inflammation by this process than by any of the others ; for less injury is inflicted upon the tunics of the eye. It is not applicable to hard cataracts, on account of the difficulty in dividing them, and the slowness with which they are absorbed. The chief inconvenience of the operation is, that in consequence of incomplete absorption in some cases, a second becomes necessary. It is fortunate, however, in this respect, that the eye can bear two or three operations as well as one.

The return of the cataract to its original place in the axis of vision is an occurrence which sometimes happens. It may take place a few days after the operation ; or, as has in a few instances been known, after the lapse of several years. In the former case a second operation is necessary when the effects of the first have been removed. The operation of extraction might be performed in either instance ; but in the latter, it is the most advisable.

Operation by Extraction.—The intention in this operation is to get rid of the cataract by removing it from the eye through the cornea. Extraction is decidedly the most difficult mode of operating, from the precision and accuracy with which it is necessary to manage the instrument, and the accidents which constantly threaten to thwart its success, and sometimes even its completion. It is performed with a knife, first used by Mr. Barth of Vienna, but known as Beer's knife. The intentions to be fulfilled by the instrument, are first to puncture the cornea, for which purpose it has a lancet-shaped point ; secondly, to make a section of the cornea, and it therefore has one long cutting edge ; thirdly, to fill entirely, during the execution of these objects, the incision it makes, until the whole section be completed. The shape of the knife is, therefore, triangular, the apex being the point, and the longest side the cutting edge. The necessity that the incision should be constantly filled by the knife, is that the aqueous humor may not escape. The

occurrence of which circumstance causes the cornea to become flaccid, and consequently to receive an irregular or jagged section. The knife should, therefore, not only gradually increase in breadth, but also in thickness. The whole blade is eighteen lines in length. The instrument is to be taken in the hand, and managed in the same manner as the needle is in depression.

The mode of conducting the operation is as follows :—

The point of the instrument is presented perpendicularly to the cornea, a short distance below its horizontal diameter, and about a line from its outer margin; the flat side of the knife being in the vertical plane of the eye. The cornea is then punctured, and immediately the knife is turned in such a manner, that the point enters the anterior chamber parallel with the surface of the iris. The knife is then passed steadily, and as rapidly as is consistent with safety, through the anterior chamber, until the point reaches the cornea on the inner side of the globe. In this course, the surgeon's eye should be constantly fixed on the point of the instrument, to see that it does not touch the iris. Having reached the internal surface of the cornea on the inner side, the knife is firmly forced through, and is then carried forward towards the nose until it cuts itself out with a clean, smooth incision. If the blade prove not long enough, a steady back stroke is made to finish the section. Especial care is here requisite to keep the side of the knife parallel with the iris, or it may turn inward and cut the sclerotica; or outward, and emerge too near the horizontal diameter of the cornea. The section of the cornea being made, a delicate hook, or curved needle is introduced under the flap, with its convexity turned upward, and passed through the pupil to lacerate the capsule by two free strokes made at right angles. The cataract is then seized with the instrument and withdrawn through the section. This part of the operation sometimes demands great caution, for a large cataract does not readily pass through the pupil. When the extraction is made slowly, the pupil gradually expands, and suffers the cataract to pass, though it sometimes appears that the iris is about to be torn from its attach-

ments. The moment the extraction is completed, the assistant allows the lid to fall.

During the several processes a number of accidents may befall the operator. Thus, if the knife be not placed perpendicularly upon the cornea, it may pass between its lamina and fail to make the required incision. The puncture of the cornea may be followed by the escape of the aqueous humor, by which means the cornea loses its convexity and is liable to receive a rough incision. The iris likewise, being deprived of its support, may fall forward and be wounded. When the escape of the aqueous humor produces these changes in the situation of the cornea and iris, to guide the knife between them is a delicate task, and the surgeon is involved in the most difficult part of the operation. If the iris fall before the knife, the instrument must be withdrawn. Sometimes stimulating the iris by allowing the lid to fall while the surgeon keeps the knife at rest, and then quickly opening it again, causes a contraction which liberates it from before the edge of the instrument. The same object is sometimes attained by gently rubbing the globe of the eye with the finger nail, or the handle of a cataract needle. Again, when the second puncture of the cornea is to be made, the pressure of the knife may force the globe inward, by which means the puncture may not be formed sufficiently near the inner margin of the cornea to afford an ample incision. The corneal section may be followed by prolapsus iridis, which must be returned before the operation can proceed. If the lid be allowed to fall and remain a few moments over the eye, and be then quickly opened towards a strong light, the natural action of the iris may restore it to its place. If this fail it must be returned by means of a curette ; and, finally, when the cataract is withdrawn, prolapsus iridis may again occur, or the vitreous humor may escape. The prolapsus must be returned in the same manner as before. Loss of the vitreous humor is of but little consequence. It is quickly reformed, and vision does not suffer. To prevent these accidents the precautions given should be carefully followed ; the patient should be ope-

rated upon lying on his back, to prevent as far as possible the escape of the vitreous humor ; and, if this do happen, to allow the iris to fall backward ; the assistant should avoid pressing the globe ; and the surgeon should have practised the operation as far as possible on the dead eye, and then operate with firmness and presence of mind.

Baron Wenzel, is stated to have said, that “before he learned to extract, he had destroyed a hat full of eyes :” and, from the reports of some of the present French surgeons, it would appear that they use still larger measures. The dangers of the operation, together with the greater liability to future inflammation, are considered just reasons for the preference given to depression.

When extraction is performed, it is generally selected for hard cataracts, though any, but such as are very soft, may be thus removed. In traumatic cataract, where the lens has entered the anterior chamber, it is most advantageously employed. When the lens is in this situation, it usually follows the removal of the knife, and the operation is then finished. Sometimes from the collapse of the cornea, it returns to the posterior chamber, and must then be extracted by the hook, or by gentle pressure on the globe. It has, also, been known to escape into the vitreous humor, out of the axis of vision, and be then absorbed. If secondary capsular cataract follow, it may be removed by the operation of absorption.

The second mode of operating by extraction, is performed in the same manner as the former, except that the section is made in the superior instead of the inferior part of the cornea. It is most highly recommended by Graefe of Berlin, who reports the cure of seventeen out of eighteen cases by this operation. The advantages he attributes to it are, that the aqueous humor is less liable to escape ; and that prolapsus iridis takes place with greater difficulty.

3. *Treatment after the operation.*—Within six hours after the operation on a cataract, the eye should be examined, and active treatment be commenced, if the least unfavorable symp-

tom exist. The indication of treatment is *to prevent* the occurrence of inflammation; and not to subdue it when it has once commenced. All the parts wounded in the operation by depression are subject to subsequent inflammation, but its most frequent seat is the iris. If disease in these cases be not checked by energetic management, it proceeds to a destructive extent. Severe iritis, together with external ophthalmia, may be conjoined with amaurosis or glaucoma, giving rise to much suffering, and perhaps the loss of the eye. If, then, at the first examination any pain be present in the head, or eye, or any evidence of commencing inflammation be detected, blood should immediately be taken from the arm. If the symptoms be very trivial, the application of cups to the temple, together with an active cathartic will suffice. When, however, they manifest any severity, venesection should at once be resorted to. With this, antimonial solution; or magnes : sulph : with antimon : tartr : may be prescribed, as the case may require.

The following formula possesses great power in reducing acute external inflammation of the eye, as of the conjunctiva and cornea.

Rx. Magnes : Sulph : ℥ ii.
 Antimon : Tartr : gr. iii.
 Aq : Puræ ℥ xvi. M.

Of this ℥ii may be taken every hour until an emetic and cathartic effect are produced. It should be then discontinued; and be repeated the first or second day afterwards as occasion may demand. With this, fomentation of the eye with warm water, or the lot : opii should be conjoined. This remedy is much less effectual in iritic inflammation, or any form of internal ophthalmia.

In very severe iritis it is necessary to obtain the constitutional effects of mercury in the most speedy manner. For this purpose the combination of calomel and pulv : antimon :

Rx. Calomel : gr. ii.
 Pulv : Antimon : gr. iii. M.
 Fit in pil.

may be prescribed every third or fourth hour. When the symptoms are less acute, the mercury may be introduced into the system more gradually. Under this treatment the inflammation seldom fails to subside.

The temperature of the patient's apartment should not be disregarded, for exposure to cold is sufficient to thwart the most active, and well-directed remedies.

A long course of treatment of a general antiphlogistic character sometimes induces a state of debility in which the inflammation remains obstinately stationary, or becomes worse; recourse, in this state, to a tonic regimen, often produces a decided improvement.

The occurrence of *glaucoma*, or *amaurosis* after the operation, may be removed by the same remedies employed for iritis. The actual existence of iritic inflammation must be overcome by the use of mercury in small, often-repeated doses, until it affects the system sufficiently to control the disease. The action of mercury requires also the aid of frequent cupping, the application of blisters, and strict attention to diet. If either of these affections continue with unusual obstinacy, as sometimes occurs, the application of blisters requires some management. One may be applied over the eyebrow; and, when after four or five days it has healed, another may be put behind the ear; a third may be placed on the nape of the neck; and thus a succession may be used, if necessary, at intervals of a few days. This course obviates the necessity of applying a new blister to an already inflamed surface, and yet maintains an active and constant counter-irritation.

The conjunctival inflammation which follows an operation is sometimes accompanied with *chemosis*. This effusion is, however, absorbed as the inflammation is subdued. It does not require that the conjunctiva should be punctured, unless its distention be very great, and threaten to rupture the membrane.

Contraction of the pupil may occur as the sequel of iritis.

In this case, an operation to form an artificial pupil will be necessary.

Prolapsus iridis occasionally happens a short time after the operation of extraction, exciting inflammation, and causing an adhesion to it of the edges of the cornea. In addition to the general treatment for the inflammation, it will be necessary either to cut off the prolapsed portion of iris, with a curved scissors, or to touch it with the *argentum nitratum*.

The surgeon should be careful to examine the eye within a short time after an operation of extraction, to ascertain if the edges of the corneal incision be precisely in coaptation. They sometimes become so separated that the inner edge of one flap unites to the external edge of the incised surface on the other. This circumstance creates additional irritation in the wound, protracts the process of adhesion, causes a greater deposition of fibrin, and consequently a larger cicatrice.

Vomiting, which may happen after an operation, is always a dangerous occurrence. From the violent agitation of the head which it causes, the depressed cataract may again rise to the axis of vision, while the cerebral congestion it occasions, is liable to induce inflammation. It is chiefly incident to old persons who have led an intemperate life; and, if its occurrence could be correctly foretold, would forbid an operation. The vomiting must be allayed by narcotics, or such remedies as the state of the stomach indicates.

When no untoward symptoms appear, the patient should be kept for a few days in a darkened room; a shade should be kept before the eye to prevent any sudden admission of light; his regimen should be of the mildest character; and the occasional use of an aperient should be resorted to. This cautious system should be continued for a couple of weeks, or until the wounds in the eye have entirely united, and all preternatural excitement of the organ has subsided. The person may then gradually return to his usual exercise, and diet. Several months should elapse before the eye is in any manner tasked.

As, now, the natural refracting lens of the eye has been re-

moved, its place must be supplied by one which is artificial. A double convex glass, adapted to the patient's vision should be procured, and be constantly worn. Two glasses of different powers are generally required; one adjusted for distant objects, and one for subjects requiring minute inspection. The use of the glass must not be commenced until every trace of irritation be removed, and the eye have regained its natural tonic condition. In regard to the selection of glasses, particular directions cannot be given. The eye must be tried with several of different power; and that chosen which enables the patient to see most distinctly, without occasioning any sense of straining, or smarting in the eye. The glasses which most frequently suit the eye for reading, are those which have a focus of two or three inches. The focal distances of glasses for general use vary, in most instances, between three and a half, and five inches.

Having thus fulfilled, though indifferently, the requisition of the college, it only remains for me to thank the professors for the instruction I have derived from their knowledge; and to assure them, that the hopes they have expressed for the future success of the graduate, are reciprocated in a sincere wish for their continued prosperity.

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